Experiment No: 08

Experiment Name: DHCP, DNS, and Web Server Configuration.

Theory:

DHCP Server

The Dynamic Host Configuration Protocol (DHCP) is a network management protocol used to automatically assign IP addresses and other configuration parameters to client devices. This automation eliminates the need for manual setup, minimizes IP conflicts, and simplifies large-scale network administration. When a client device joins a network, it broadcasts a DHCP request. The DHCP server responds with an IP address offer containing the subnet mask, default gateway, and DNS server information. Once accepted, these settings enable the client to communicate seamlessly within the network.

DNS Server

The Domain Name System (DNS) converts human-readable domain names (e.g., example.com) into corresponding IP addresses recognized by computers. When a user enters a web address, the DNS server resolves it to the appropriate IP, enabling the browser to establish a connection with the destination server. This service enhances user convenience, reduces configuration complexity, and allows efficient access to network and web resources without needing to remember numeric IP addresses.

Web Server

A Web Server stores, processes, and delivers web content to clients via the HTTP or HTTPS protocols. When a user requests a webpage, the server interprets the request and transmits the corresponding HTML files, images, and data back to the client. Web servers such as Apache and Nginx support multi-user access, host applications, and integrate with databases and scripting technologies to deliver dynamic and interactive content. They are essential for making websites and online services accessible to users.

Components:

1. Cisco Packet Tracer
2. PT-Routers
3. PT-Switches
4. DHCP, DNS, and Web Servers
5. Connection Cables

Procedures:

Task 1: DHCP, DNS, and Web Server Setup (Single-Switch Network)

Objective: To configure a single-segment network (192.168.1.0/24) in which clients automatically receive IP addresses from a DHCP server and access a web server using DNS name resolution.

Device	Interface	IP Address / Configuration	Gateway	Service
DHCP Server	Fa0	192.168.1.3 (Static)	192.168.1.1	DHCP, HTTP
DNS Server	Fa0	192.168.1.4 (Static)	192.168.1.1	DNS, HTTP
Web Server	Fa0	192.168.1.5 (Static)	192.168.1.1	HTTP
Router0	Fa0/0	192.168.1.1 (Static)	—	Default Gateway
Laptop0	Fa0	DHCP (Dynamic)	—	Client

Configuration Steps:

1. Launch Cisco Packet Tracer and place one router (Router0), one switch (Switch0), three servers (DHCP, DNS, and Web), and one laptop (Laptop0). Connect all devices using copper straight-through cables.

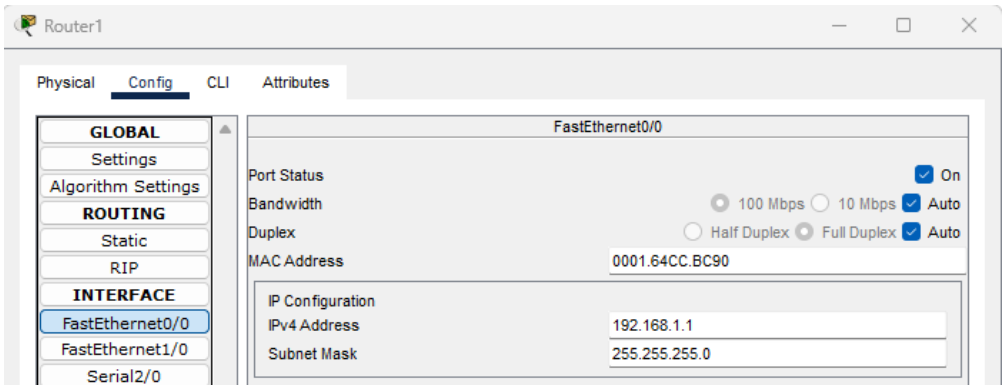

Figure 01: Fast-Ethernet Static Configuration fa0/0.

2. Configure static IP addresses and the default gateway (192.168.1.1) on all servers. Set Router0's Fa0/0 interface to 192.168.1.1 and enable the interface.

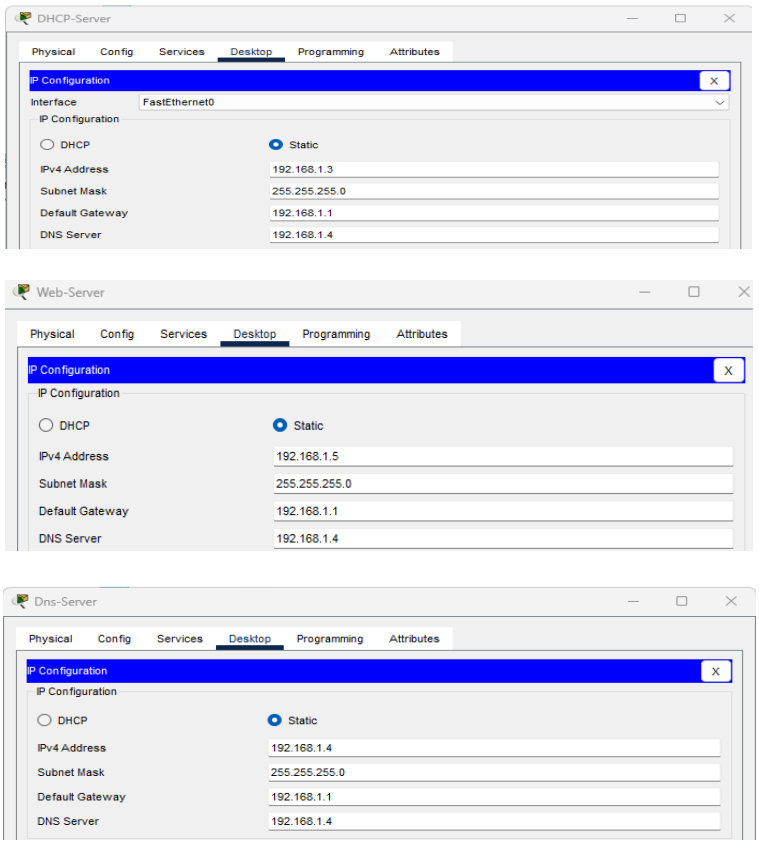

Figure 02: DHCP, DNS, WEB Servers Static IP Address Input.

3. Exclude static addresses (192.168.1.3–192.168.1.5) from the DHCP pool. Create a DHCP pool defining the Network (192.168.1.0/24), Default Gateway (192.168.1.1), and DNS Server (192.168.1.4).

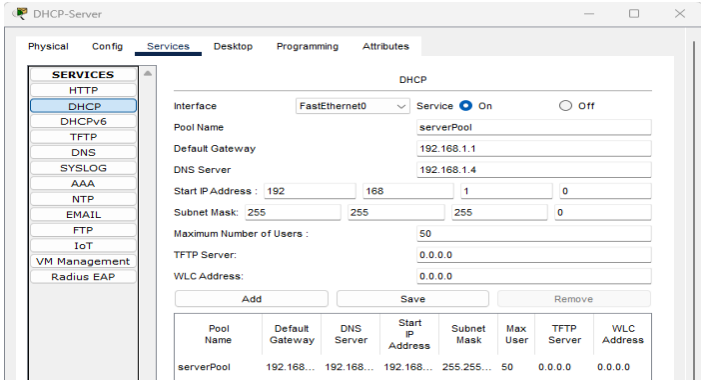

Figure 03: DHCP Server-Pool Assign.

4. Create an A Record with Name: khan.com and Address: 192.168.1.4 (DNS Server IP).

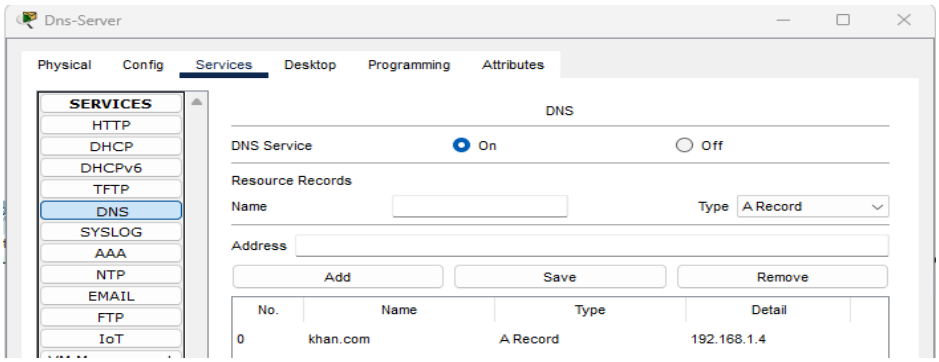

Figure 04: DNS Service Configuration.

5. Enable the HTTP service and add test webpage content in the PC (e.g., "Welcome to Cisco Packet-Tracer").

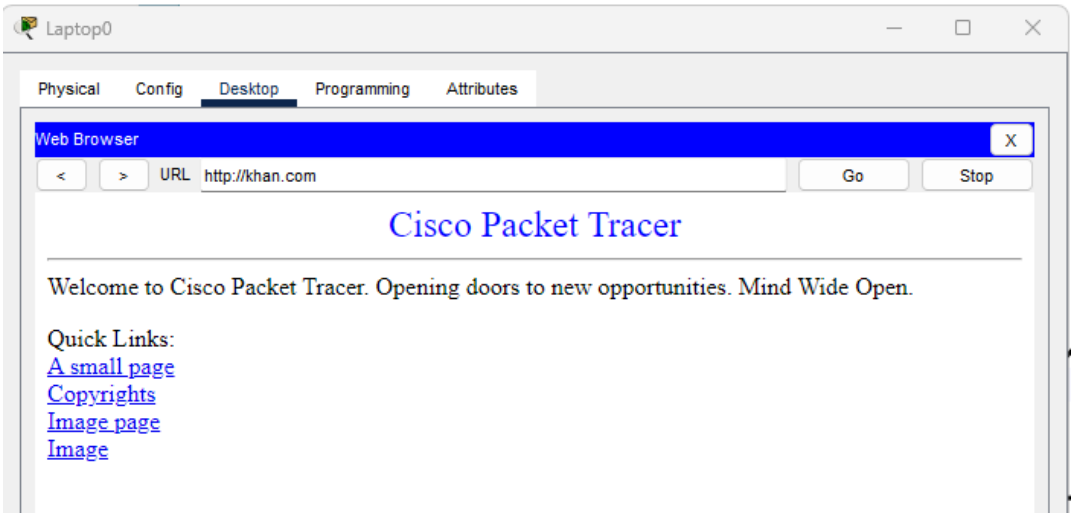

Figure 05: Web Browser Successfully Open.

6. Set Laptop0 to obtain an IP address via DHCP and verify it receives a valid address (e.g., 192.168.1.2 Test DNS resolution by navigating to http://khan.com from the Laptop0 browser.

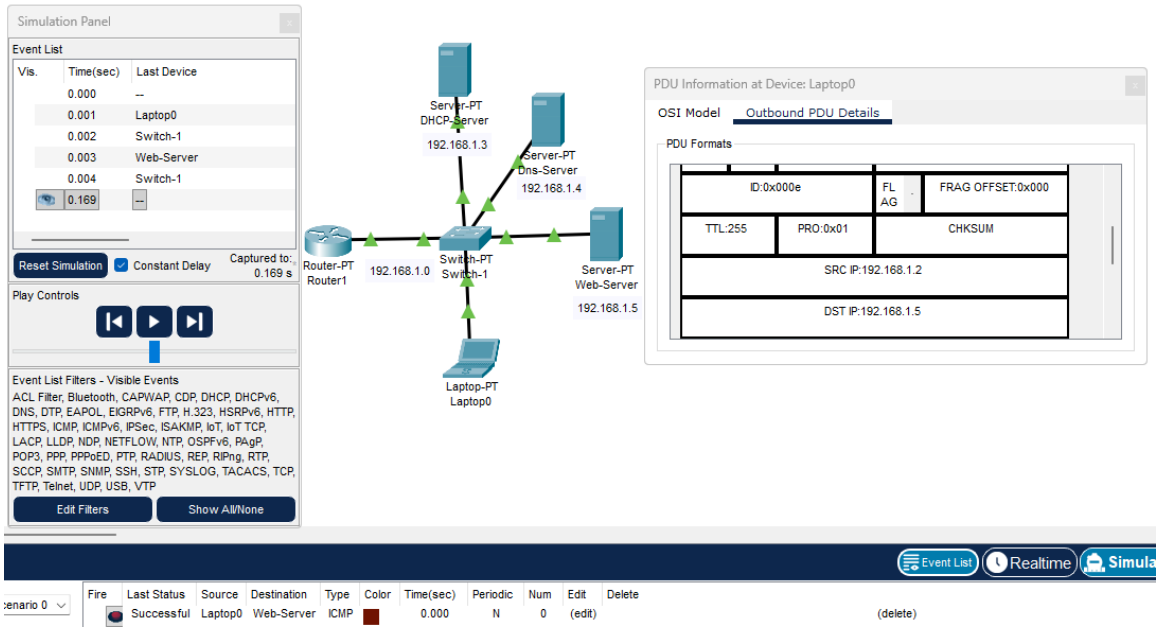

Figure 06: Single-Switch DHCP, DNS, WEB Server Setup.

Task 2: DHCP, DNS, and Web Server Setup (Dual-Switch Network)

Objective: To configure two interconnected networks (192.168.10.0/24 and 192.168.20.0/24) using a single router, enabling both subnets to access shared DNS and Web services hosted in the second network.

Device	Interface	IP Address	Subnet Mask	Default Gateway	DNS Address
Router1	Fa0/0 (Net 10.0)	192.168.10.1	255.255.255.0	—	—
Router1	Fa1/0 (Net 20.0)	192.168.20.1	255.255.255.0	—	—
DNS Server	Fa0	192.168.10.4	255.255.255.0	192.168.10.1	192.168.10.4
Web Server	Fa0	192.168.10.5	255.255.255.0	192.168.10.1	192.168.10.4

Configuration Steps:

1. Add 1 Router (Router0), 2 Switches, 4 Laptops, 1 DHCP Server, 1 DNS Server, and 1 Web Server. Connect all devices with cables.
2. Assign and enable interfaces: Fa0/0 → 192.168.10.1 and Fa1/0 → 192.168.20.1. Router0 now acts as the default gateway for both networks.
3. Configure static IPs, subnet mask, and default gateway (192.168.10.1) for both the DNS Server (192.168.10.4) and Web Server (192.168.10.5).

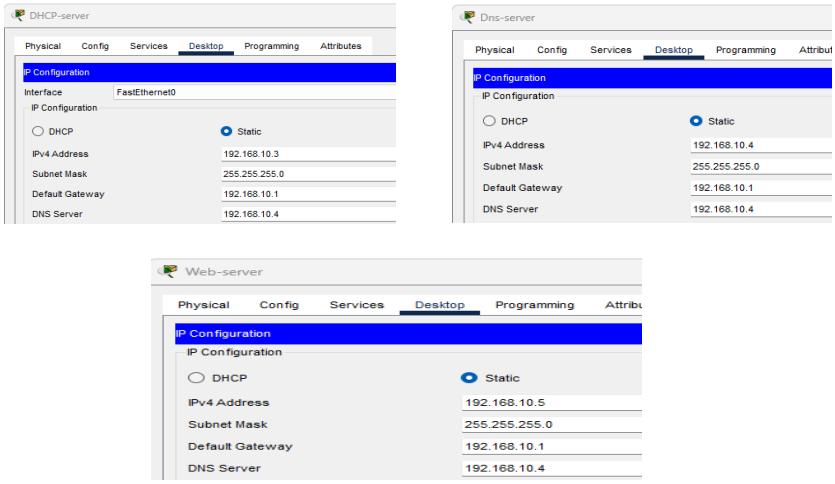

Figure 07: Static IP Address in Servers.

4. Use the DHCP server as for both connected networks. Exclude router interface addresses (192.168.10.1 and 192.168.20.1). Create two DHCP pools (Server-Pool and net2), setting the appropriate Default Gateway and configuring the DNS Server as 192.168.10.4 for both.

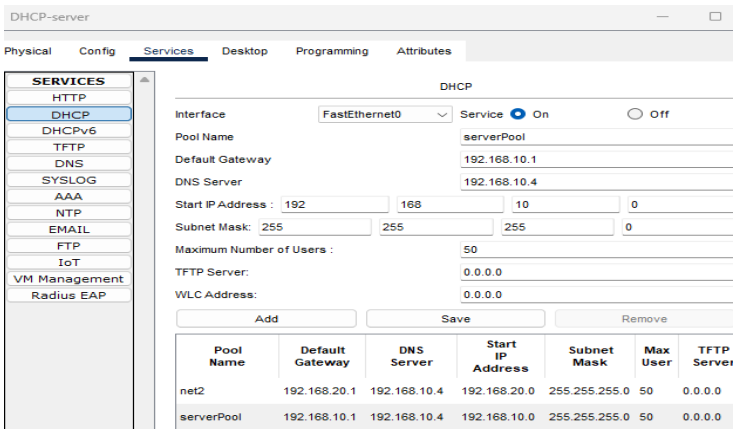

Figure 08: DHCP Pool Assign.

5. On the DNS Server (192.168.20.4), add A Records for google.com and mail.com.

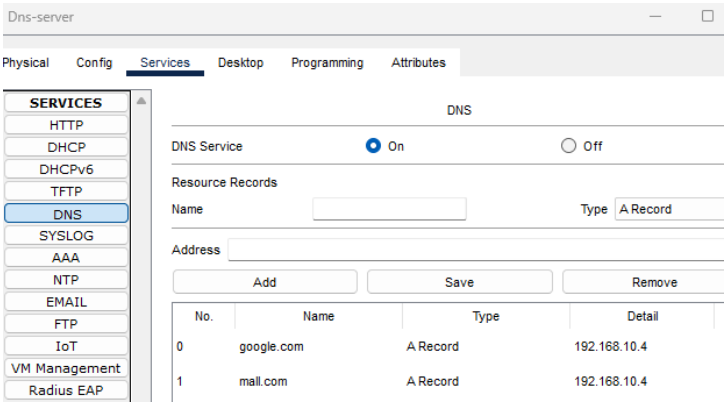

Figure 09: DNS Server Service Webpage Input.

6. Configure all laptops by DHCP addressing. Verify they receive correct IPs.

```
Router(config)#int fa1/0
Router(config-if)#ip helper-address 192.168.10.3
Router(config-if)#
```

Figure 10: IP Helper for DHCP Server check.

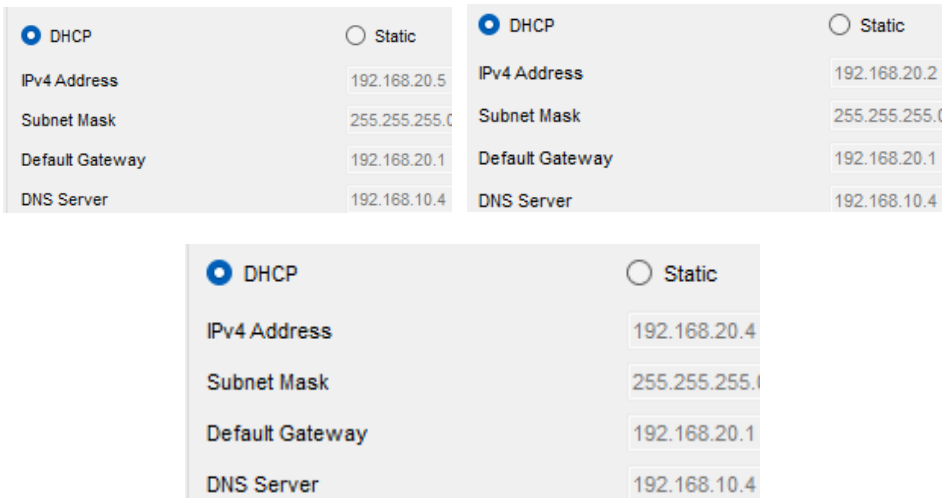

Figure 11: After Check the DHCP IP Configuration.

7. Test DNS resolution and web access by browsing to mail.com from a client in the 192.168.20.0 network (testing cross-network access).

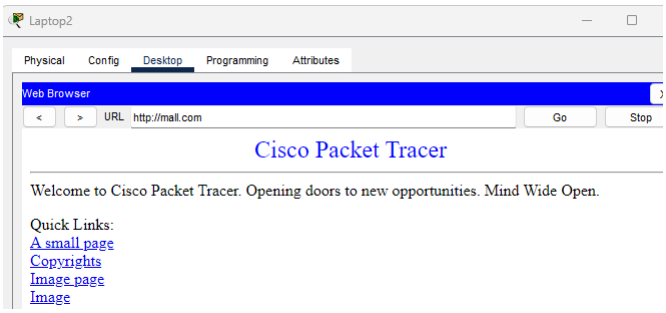

Figure 12: Web browser Check.

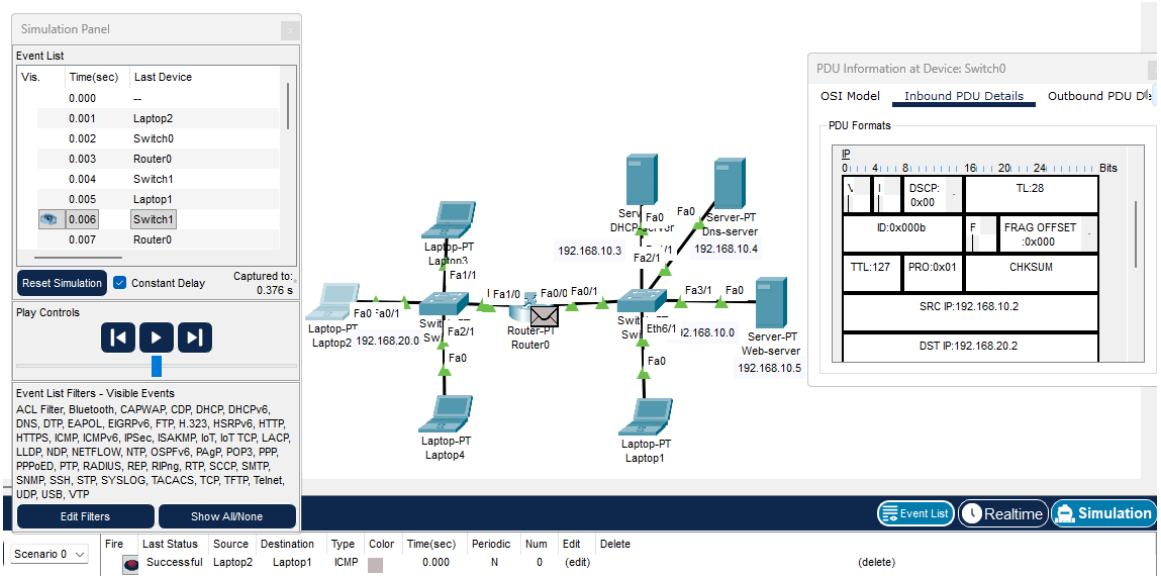

Figure 13: Dual-Switch DHCP, DNS, WEB Server Setup.

Conclusion:

This experiment successfully demonstrated the configuration and integration of DHCP, DNS, and Web Server services using Cisco Packet Tracer. In both the single-segment and dual-network topologies, we achieved dynamic IP assignment via DHCP, reliable name resolution via DNS, and successful content delivery from the Web server. The dual-network setup specifically illustrated the router's critical role in providing inter-network routing and centralized DHCP services, confirming that devices in separate subnets can efficiently access shared network resources.